

What Is Claimed Is:

1. A method of processing an image, characterized by comprising steps of:

5 identifying one candidate for human face region within said image;

calculating a probability that said candidate for human face region represents a human face; and

10 saving said probability as attached information to said image.

2. The method of processing an image according to claim 1, characterized by further comprising a step of saving identification information of said candidate for human face region as additional attached information to said  
15 image.

3. The method of processing an image according to claim 2, characterized in that said attached information and said additional attached information are saved in a predetermined format to the header file or the footer file  
20 of said image.

4. A method of processing an image, characterized by comprising steps of:

identifying one candidate for human face region within said image;

25 calculating a probability that said candidate for human face region represents a human face;

judging whether or not said candidate for human face

region represents a human face by comparing said probability with a threshold; and

saving a result of said step of judging as attached information to said image.

5        5. The method of processing an image according to claim 4, characterized by further comprising a step of saving identification information of said candidate for human face region as additional attached information to said image.

10       6. The method of processing an image according to claim 5, characterized in that said attached information and said additional attached information are saved in a predetermined format to the header file or the footer file of said image.

15       7. The method of processing an image according to any one of claim 1, characterized in that said step of calculating a probability is performed using K image processing apparatuses that have been trained with K training methods, wherein K is an integer greater than one  
20 and each of said K image processing apparatuses adopts a corresponding predetermined algorithm to generate M-dimensional vectors, and that

said step of calculating a probability comprises steps of:

25       obtaining K intermediate probabilities,  $p_1$ ,  $p_2$ , ...,  $p_K$ , for said candidate for human face region by performing following steps within each of said K image processing

apparatuses:

inputting data for said candidate for human face region;

generating a M-dimensional vector for said candidate  
5 for human face region by applying a corresponding  
predetermined algorithm to the input data for said  
candidate for human face region;

identifying among  $\prod_{j=1}^M K_j$  subspaces a subspace in which  
said M-dimensional vector for said candidate for human face  
10 region is located; and

assigning the value of the probability for the  
identified subspace to the probability for said candidate  
for human face region; and

calculating probability for said candidate for human  
15 face region with the following equation:

$$p = \alpha \left( 1 - \prod_{i=1}^K (1 - p_i) \right)$$

wherein  $\alpha$  is a factor that is less than but very closed  
to one.

8. The method of processing an image according to claim  
20 7, characterized in that each of said K training methods  
comprises steps of:

inputting data for N image regions into said image  
processing apparatus, wherein N is an integer greater than  
one, and some of the N image regions represent human faces;

generating N M-dimensional vectors for said N image regions by respectively applying said corresponding predetermined algorithm to the input data for each of said N image regions, wherein some of the N M-dimensional  
5 vectors correspond to human faces, and the N M-dimensional vectors are distributed in a M-dimensional space;

dividing said M-dimensional space into  $\prod_{j=1}^M K_j$   
subspaces, such that the number of the M-dimensional vectors distributed in each subspace is the same and equal  
10 to  $N / \prod_{j=1}^M K_j$ , wherein  $K_1, K_2, \dots, K_M$  are integers greater than one;

calculating probability for each subspace by dividing the total number of the M-dimensional vectors distributed in each subspace by the number of the M-dimensional vectors  
15 that are distributed in the same subspace and correspond to human faces; and

saving the positions and probabilities for said  $\prod_{j=1}^M K_j$   
subspaces in said image processing apparatus.

9. The method of processing an image according to claim  
20 8, characterized in that K equals to one and  $\alpha$  equals to one.

10. An apparatus for processing an image, characterized by comprising:

a candidate selector for identifying one candidate for human face region within said image;

a probability calculator for calculating a probability that said candidate for human face region  
5 represents a human face; and

a probability writer for writing said probability as attached information to said image.

11. An apparatus for processing an image, characterized by comprising:

10 a candidate selector for identifying one candidate for human face region within said image;

a probability calculator for calculating a probability that said candidate for human face region represents a human face; and

15 a judging unit for judging whether said candidate for human face region represents a human face by comparing said probability with a threshold; and

a judging result writer for writing an output of said judging unit as attached information to said image.

20 12. A method of processing an image, characterized by comprising steps of:

obtaining at least one probability, each of said at least one probability representing possibility that one candidate for human face region within said image  
25 represents a human face;

calculating a portrait probability for said image based on said at least one probability; and

saving said portrait probability as attached information to said image.

13. The method of processing an image according to claim 12, characterized in that said attached information  
5 is saved in a predetermined format to the header file or the footer file of said image.

14. A method of processing an image, characterized by comprising steps of:

obtaining at least one probability, each of said at  
10 least one probability representing possibility that one candidate for human face region within said image represents a human face;

calculating a portrait probability for said image based on said at least one probability; and

15 judging whether or not said image is a portrait by comparing said portrait probability with a threshold; and

saving a result of said step of judging as attached information to said image.

15. The method of processing an image according to  
20 claim 14, characterized in that said attached information is saved in a predetermined format to the header file or the footer file of said image.

16. The method of processing an image according to any one of claim 12, characterized in that said step of  
25 calculating a portrait probability is performed in the following formula:

$$P = 1 - \prod_{i=1}^N (1 - p_i)$$

wherein,  $p_i$  denotes the probability for the  $i$ -th candidate for human face region;  $N$  denotes the number of candidates for human face region within said image;  $P$  denotes said portrait probability of said image.

17. The method of processing an image according to any one of claim 12, characterized in that said step of calculating a portrait probability is performed in the following formula:

$$P = 1 - \prod_{i=1}^K (1 - \psi_i)$$

wherein,  $\psi_i$  denotes the  $i$ -th greatest probability for candidate for human face region;  $K$  denotes the number of candidates for human face region within said image which are selected to have the greatest probabilities;  $P$  denotes said portrait probability of said image.

18. The method of processing an image according to any one of claim 12, characterized in that said step of calculating a portrait probability is performed in the following formula:

$$P = \text{Max}\{p_1, p_2, p_3, \dots, p_N\}$$

wherein,  $p_i$  denotes the probability for the  $i$ -th candidate for human face region;  $N$  denotes the number of candidates for human face region within said image;  $P$  denotes said portrait probability of said image.

19. An apparatus for processing an image,

characterized by comprising:

a probability for candidate for human face region calculator, for obtaining at least one probability, each of said at least one probability representing possibility  
5 that one candidate for human face region within said image represents a human face;

a portrait probability calculator for calculating a portrait probability of said image that said image is portrait; and

10 a probability writer for writing said probability as attached information to said image.

20. An apparatus for processing an image, characterized by comprising:

a probability for candidate for human face region  
15 calculator, for obtaining at least one probability, each of said at least one probability representing possibility that one candidate for human face region within said image represents a human face;

a portrait probability calculator for calculating a  
20 probability that said candidate for human face region represents a human face; and

a judging unit for judging whether said image is portrait by comparing said probability with a threshold; and

25 a judging result writer for writing an output of said judging unit as attached information to said image.

21. A storage medium storing a computer program for



processing an image, characterized by comprising:

code means for identifying one candidate for human face region within said image;

code means for calculating a probability that said candidate for human face region represents a human face;  
5 and

code means for saving said probability as attached information to said image.

22. A storage medium storing a computer program for  
10 processing an image, characterized by comprising:

code means for identifying one candidate for human face region within said image;

code means for calculating a probability that said candidate for human face region represents a human face;

15 code means for judging whether or not said candidate for human face region represents a human face by comparing said probability with a threshold; and

code means for saving a result of said step of judging as attached information to said image.

20 23. A storage medium storing a computer program for processing an image, characterized by comprising:

code means for obtaining at least one probability, each of said at least one probability representing possibility that one candidate for human face region within  
25 said image represents a human face;

code means for calculating a portrait probability for said image based on said at least one probability; and

code means for saving said portrait probability as attached information to said image.

24. A storage medium storing a computer program for processing an image, characterized by comprising:

5       code means for obtaining at least one probability, each of said at least one probability representing possibility that one candidate for human face region within said image represents a human face;

code means for calculating a portrait probability for  
10 said image based on said at least one probability; and

code means for judging whether or not said image is a portrait by comparing said portrait probability with a threshold; and

code means for saving a result of said step of judging  
15 as attached information to said image.